

Constructivism in the Classroom If I Teach This Way, Am I Doing My Job?

Educational technologists have often stated that an effective way to integrate technology into the teaching and learning process is to follow a constructivist model. Although teachers may have technical skills, they may not understand how constructivism translates into effective classroom practice. This article describes the value of integrating technology with student-centered, meaningful, and engaging learning experiences based on constructivist theory.

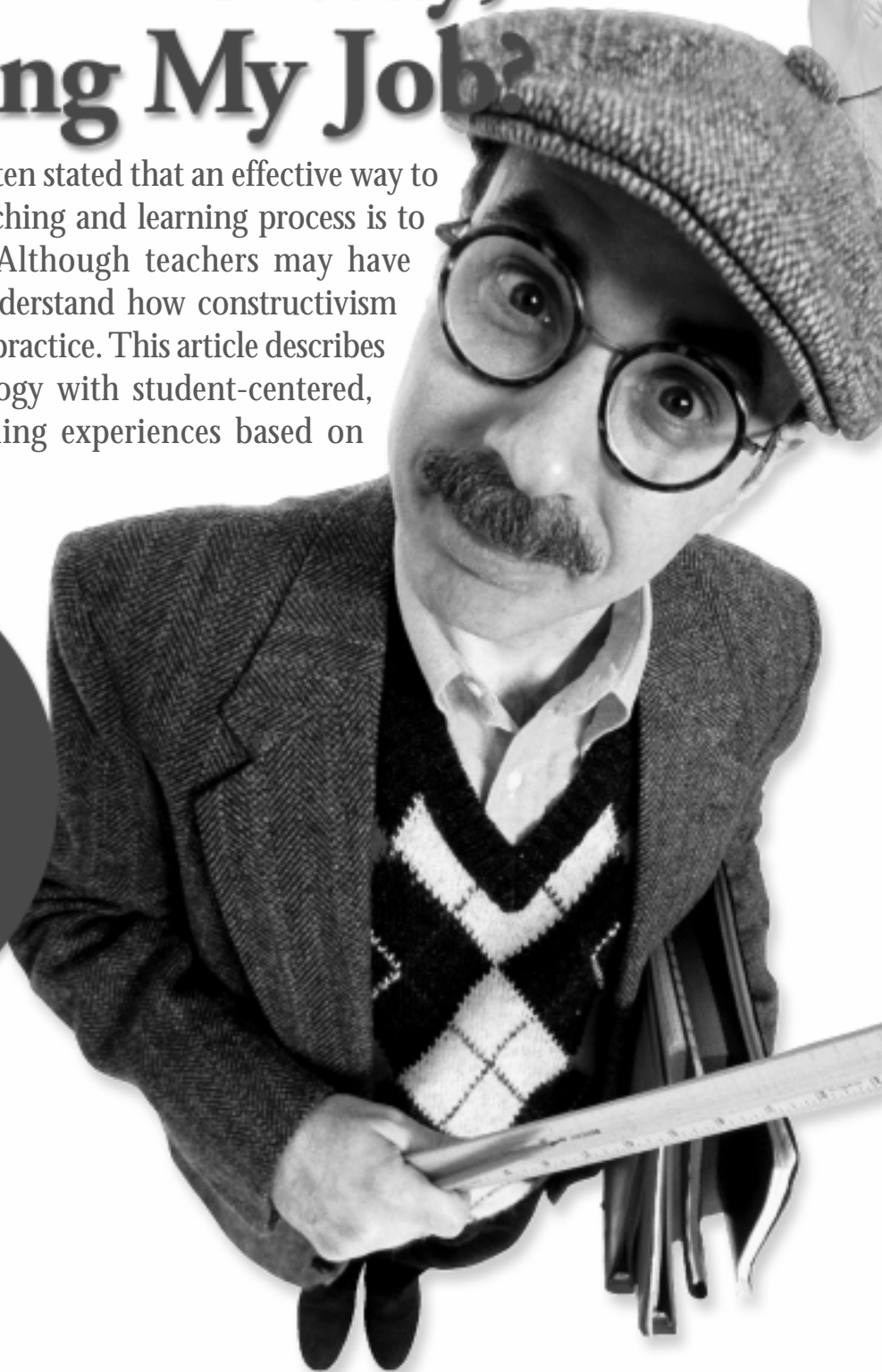
"I can't let the students surf the Web or play on the computer. That is like having 20 minutes free on Friday and telling the students to do whatever they want. If I do that, I am not doing my job."

*By Debra Sprague
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Subject: Constructivism

Grade Level: All

Technology: Personal Digital Assistant (PDA)





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Two recent experiences reinforced that how we view our roles as teachers influences how we teach with technology. Several teachers were conducting a workshop for other teachers designed to focus on technology integration. One instructor presented a lot of how-tos and step-by-step demonstrations but very little modeling of integration. Another instructor indicated that while other participants were doing a structured activity, he allowed some participants to surf the Web, then asked them to report back to the group what they had found. The first teacher made a comment that reflected her philosophical belief about teaching: "I can't let the students surf the Web or play on the computer. That is like having 20 minutes free on Friday and telling the students to do whatever they want. If I do that, I am not doing my job."

A second example shows how beliefs about teacher roles influence instructional practices. A high school teacher was designing a project on finances for her students. Although she had taught this material several times in the past,

she was now to integrate technology into the project. The teacher understood that students need time to explore the material so they can construct their own knowledge. She had read about constructivist theory (students learn by taking in information from the world and constructing their own meaning from the experience as opposed to someone telling them bits of information) and had seen it modeled in her university courses. However, when it came time to implement this approach, she was reluctant to allow students to be in charge of their learning. She said, "I don't see that as teaching. The noise level was very loud, and I was nervous when my principal walked in. What will he think about my teaching with all that noise? I just felt I was not doing my job. I know I should teach that way, but it is not my style."

Although both of these teachers had technical skills, they were not successful at integrating student experiences with technology into the curriculum using a constructivist approach. They did not understand how constructivism translates into effective classroom practice at least as demanding of teacher excellence as presentational instruction. When one integrates student experiences with technology into the curriculum, the role of the teacher changes. The teacher no longer has to be in charge every minute, but can give some of the con-

trol over to the students and the technology. If approached in a constructivist manner, the teacher's job becomes one of facilitator or architect (Norton & Wiburg, 1998). Instead of telling students the answer, the teacher asks questions to help them discover the answer themselves. For this type of teaching to be successful, teachers need to give students time to explore the material and construct meaning from the experience.

Teachers sometimes are concerned about such a shift; they worry about losing control, not fulfilling their role, or being seen as less effective by parents, principals, or supervisors. This article briefly describes the learning theory that underlies constructivism, then shows that constructivist teachers work as hard or harder than teachers who rely on presentational methods.

Constructivist Theory

Educational technologists have often stated that an effective way to integrate technology into the teaching and learning process is to follow a constructivist model (Dede, 1995; Jonassen, 1996). Constructivist theory posits that students make sense of the world by synthesizing new experiences into what they have previously understood. They form rules through reflection on their interaction with objects and ideas. When they encounter an object, idea, or relationship that does not make sense to them, they either interpret what they see to conform to their rules or they adjust their rules to better account for the new information (Brooks & Brooks, 1993).

Although not so much a theory of teaching as of learning, there are some behaviors teachers can emulate if they wish to follow a constructivist paradigm. Constructivist teachers organize information around conceptual clusters of problems and questions as opposed to facts in isolation. Activities should be

authentic (tasks should be relevant or of emerging relevance to students). Such activities are often problem-based rather than drill-and-practice. Instead of concentrating on knowledge acquisition, problem-based activities allow students to develop a deeper understanding of the knowledge domain.

Technology is used as a tool to help students solve the problem. Technical literacy should not be taught as an isolated subject, nor should activities with technology be isolated from other activities in the classroom. This does not mean that time should not be spent teaching students content or how to use a technology tool. However, assimilating the content should occur at the time the students need to master the material, and only as much instruction as they need to complete their project should be provided. It is not necessary to teach students everything about a particular tool or concept before they start using it.

Constructivist teachers allow student responses to drive lessons, shift instructional strategies, and alter content. This does not mean that if students are not interested in a topic, it should not be taught. Instead, students' knowledge, experiences, and interests occasionally do coalesce around an urgent theme. When events occur that exert an irresistible pull on students' minds (such as during President Clinton's impeachment trial or the shootings in Littleton, Colorado), continuing with preplanned presentational lessons is often fruitless (Brooks & Brooks, 1993). Instead, teachers should relate the concepts and skills to be learned to students' current interests.

Elizabeth was aware of what was happening in her class. The students were actively involved in their projects, and she knew which students were on task. She knew who was having difficulties and noted the students' successes.

Constructivist teachers encourage student inquiry by asking thoughtful, open-ended questions and encouraging students to ask questions of each other. The questions are designed to challenge students to look beyond the apparent, delve into issues deeply and broadly, and form their own understandings. Often, there is no one "right" interpretation, even though some analyses are more sophisticated and useful than others. Students are encouraged to talk to each other and the teacher. This gives students the opportunity to present their own ideas and to hear and reflect on the ideas of others.

In a constructivist classroom, students are more actively involved than in a traditional classroom. They are sharing ideas, asking questions, discussing concepts, and revising their ideas and misconceptions. Such activity involves collaboration, with occasional competition, among students. Collaborative environments can encourage the knowledge construction needed for more lasting learning (Jonassen, 1996).

Using Constructivist Methods in an Instructionist Setting

As teachers, we are taught to believe that learning takes place in a quiet and orderly setting. Activities in which students are taking an active role and sharing information with each other make for noisy classrooms. To an outsider, the classroom may appear to be in chaos. This does not mean students are not learning. Such activities are often more motivating and interesting to students because they are learner-focused and authentic, encourage critical thinking,

and create knowledge that is lasting, transferable, and useful (Carr, Jonassen, Litzinger, & Marra, 1998).

Teachers worry that this type of classroom environment may be misinterpreted by others who see a constructivist teacher as not in control or not working hard. The following scenario shows how an outsider without knowledge of constructivism (in this case, a principal) might view a constructivist classroom in comparison to a more traditional classroom.

Scenario 1: Teachers at Work

Teacher Elizabeth Adrian stood next to a team of students in her eighth-grade classroom, her gaze occasionally scanning across the other teams working on their projects. Each group of learners was developing a different topic, all related to interacting societal roles in the Middle Ages. As Principal Roger Helmquist watched Elizabeth through the window in her classroom door, he was struck by how quiet and passive she seemed in contrast to the noisy, excited activity of the children. "She isn't working very hard," he thought to himself, "just observing the students. And they seem to be playing on the computers more than studying; they aren't reading in the text or taking a test or writing out an assignment. And that small device she is carrying looks like a video game?! I wonder why the parents are so enthusiastic about the projects their children bring home."

Elizabeth was thinking about a variety of interwoven issues: As she looked over Timothy's shoulder, she noted that his ability to organize ideas was improving. Unobtrusively, she touched the screen of the personal digital assistant (PDA) she was carrying to note Tim's progress. Later that day, she would download this and many other individual gains noted in the PDA to her classroom computer, part of a longitudinal database charting each child's individual progress on a variety of higher-order cognitive, affective, and social skills.

At the same time, she was pondering whether to intervene in this group's work to move them beyond collecting further information on feudal agriculture and into the types of health issues characteristic of that period. Without disrupting the team's flow of thought, she interjected a question about what types of pests lived off grain and whether those posed potential medical problems. She was pleased to see Susan's eyes gleam at this query; Susan's brother was in poor health, so her interest in illnesses was high.

Across the room, Elizabeth noted that Todd was beginning to disrupt his group again. He had been involved for 10 minutes this time, a significant increase in his ability to concentrate at the start of the semester. In a little while, she would need to step over and refocus the group to keep him involved. Elizabeth lingered for a moment, however, thinking about an idea she'd just had on how to relate this material to the science topics to be covered this month. She would need to talk to the science teacher and perhaps spend some time tonight refreshing her knowledge on that material.

At that moment, one of the computer monitors went blank. "Tracy," said Elizabeth calmly, "would you please wiggle the connection at the back of that machine?" She used the PDA to note an increase in Leslie's social involvement in her group before moving over to work with Todd.

Principal Helmquist watched in some confusion from the doorway. The noise level in the classroom was barely acceptable, and this certainly did not look like what he would call effective teaching. With a sigh, he walked across the hall to view math teacher Edmund Etheridge. "This is more like it," Roger thought. "All the children quiet, in neat rows, taking notes. And Edmund actively lecturing at the blackboard doesn't need fancy, expensive props like computers. Why can't all my teachers be hard workers like him?"

Edmund, who had given the same lecture on this day for the past nine years, was going through the motions while he contemplated whether to fertilize his lawn this week or next.

Comparing Teaching Styles

In Scenario 1, Principal Helmquist compares Elizabeth Adrian, a constructivist teacher, with Edmund Etheridge, a more conventional, presentational teacher. Despite evidence to the contrary (e.g., parents excited about the work of students in Elizabeth's class), Principal Helmquist believes Edmund is the better teacher. Edmund's class is quiet and orderly compared with Elizabeth's sometimes noisy class. Edmund is actively involved by giving a lecture to his students. Elizabeth, on the other hand, does not appear to be engaged with the students. She appears to be passively observing the students while playing with some type of handheld device. To an outsider, Elizabeth's room may look chaotic, and she may not appear to be doing her job. However, this is not the case.

Principal Helmquist assumes Edmund is the harder working teacher. What he does not see is the amount of preparation Elizabeth had to do for today's lesson. She needed to do outside reading to be able to answer students' questions and steer them in alternative directions. She had to have a deeper understanding of the material than what was presented in the textbook. Edmund, on the other hand, has given the same lecture for the past nine years. He had the lecture memorized, and he did not stray from the material he planned to cover. Because students

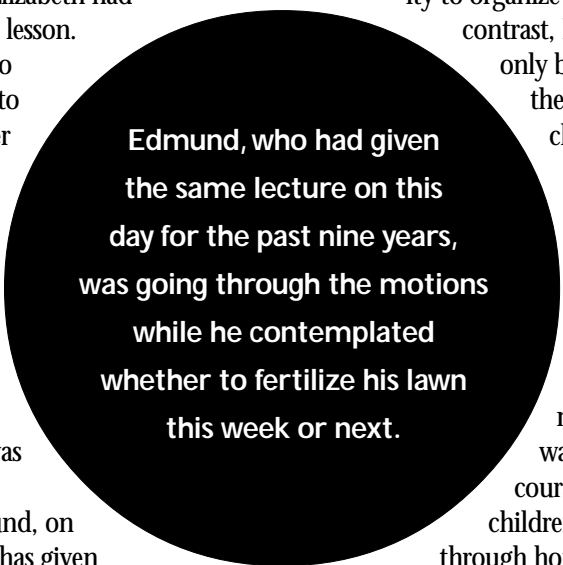
were not asking questions, there was no need for him to develop a deeper understanding of the material.

Elizabeth knew her students and was able to provide them with information relevant to their lives. She knew that Susan's brother was sick and that she was currently interested in health issues. Although the topic was the Middle Ages, Elizabeth was able to capitalize on Susan's interest by directing the students to look at medical issues of the time period. Edmund was unaware of his students' interests and did not change his lecture to account for their experiences.

Elizabeth, through the use of her PDA, was able to keep track of students' behaviors. She was excited about the next parent-teacher conference. She will have the opportunity to show Todd's parents how much his attention span had improved during the past nine weeks. She knows they will be pleased to see the improvement. Her notes on the PDA will clearly show when he was on task and when he was off. They will also help her know which activities hold his attention and what topics interest him. And she will be able to tell Timothy's parents about his ability to organize information. In contrast, Edmund will

only be able to show the parents their children's test and homework scores. He will not be able to talk to them about their children's other improvements or suggest ways they can encourage their children's interests through home-based learning activities.

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were actively involved in their projects, and she knew which students were on task. She knew who was having difficulties and noted the students' successes. Edmund was thinking about fertilizing his lawn and was unaware that most of the students were bored and drawing pictures in their notebooks or writing down information they did not understand.

Elizabeth's class focused on learning while Edmund's class focused on "appropriate" behavior. The emphasis on learning results in long-term understanding of the material, while the emphasis on student conformance to discipline results in little recall of concepts over time (Katz, 1985). Students educated in a setting that emphasizes low-level recall of facts and recipes learn that memorizing rules and techniques matters more than context and authenticity. Instead of seeking deeper understanding, students develop short-term strategies that allow them to complete assignments and pass tests. But when asked several weeks later to apply what they have "learned," many students cannot (Brooks & Brooks, 1993).

Let's return to Principal Helmquist and join him as he attends a parent-teacher conference with Edmund and the parents of Johnny Dawkin. Afterward, Principal Helmquist will join Elizabeth as she has a conference with the Dawkins.

Scenario 2: The Parent-Teacher Conferences

Later that week, still puzzled as to why parents preferred Elizabeth's teaching to Edmund's, Principal Helmquist decided to sit in on a parent-teacher conference for each teacher. Edmund had clearly prepared conscientiously for his conference with Johnny Dawkin's parents. He showed them Johnny's weekly math test scores and indicated that, based on the questions he was missing, Johnny was having trouble with division. He suggested that they buy a

workbook to reinforce in the evenings the drills he was providing for Johnny at school. "But Johnny is so bored by math worksheets," said his mother. "It's difficult to get him to concentrate, and he seems to forget what he learns very quickly," she said. "Concentration and hard work are the keys to success in math, as in life," said Edmund, and Johnny's parents could hardly disagree. "A typical parent-teacher conference," thought Roger. "Hard to see what more Edmund could do to help."

But the principal was astonished by what happened next, in the Dawkins' conference with Elizabeth. "Johnny is so excited about history!" his father exclaimed. "How on earth do you get today's kids interested in the Middle Ages?" he asked. "Growing up today is confusing and even dangerous," replied Elizabeth, "just as it was then. They did not have to deal with drugs and AIDS, but kids at that time faced other types of perils and saw complex political and economic events happening around them. Those who do not understand history are doomed to repeat it."

Elizabeth then proceeded to take the collaborative multimedia projects Johnny had brought home and show his parents which parts Johnny had contributed. They were very impressed by the database she printed showing how his teamwork skills, on six dimensions, had evolved over the past few months. "So that's what that handheld device is for," thought Principal Helmquist. "No wonder she likes technology. And look at all the science and language skills and written communication the boy is learning."

"I guess there is more here than meets the eye," he mused later. "I wish my history classes had been like that! Maybe Edmund should sit in on Elizabeth's class to see how she does it."

Providing New Models of Teaching

In Scenario 2, Principal Helmquist's initial assessment of the Dawkins' conference with Edmund was positive. He

felt that Edmund had done all he could to help Johnny by suggesting that the Dawkins provide their son with additional drill-and-practice workbooks. Edmund ignored the Dawkins' protest that Johnny was not interested in the workbooks and that this might not be the best way for him to learn. However, Principal Helmquist's assessment of Edmund's teaching methods and conference were positive because he believed that is how teachers should behave. Without an alternative model of excellent instruction, Principal Helmquist based his opinion on what he saw as the "correct way" to teach, a model that has been around since he was a child.

When he sat in on Elizabeth's conference, Principal Helmquist was confronted with a new model of teaching, one that centered on the needs and interests of the student. He saw that Elizabeth was able to provide a richer assessment of Johnny's abilities, one that went beyond just his low-level skills and knowledge. He saw that students' learning in Elizabeth's classroom went further than her content area, including language arts and science as well.

Principal Helmquist reassessed his opinion about Elizabeth and her teaching style. Appropriately, he was primarily impressed with the amount of learning that occurred in Elizabeth's classroom, not with whether she used technology. He began to realize that the technology is simply a tool that assists Elizabeth's ongoing assessment of the students' progress and supports her in her efforts to make learning interesting, engaging, and meaningful to the students. Technology is not the key to the learning experience Elizabeth's students enjoy, just the infrastructure that makes her efforts productive and sustainable. The key to an effective learning experience is the student-centered, meaningful, and engaging experiences Elizabeth provides, all based on constructivist theory.

Conclusion

Teachers who believe that learning should be interesting and meaningful for students need to move past their concern that constructivist instruction is "not teaching." They need to understand that their view of teaching is based on an educational model that has been around since the dawn of the industrial age (Reigeluth, 1992). By being willing to challenge that model through their own practice, they can begin to educate other teachers and administrators to the power of student-centered learning enhanced by the appropriate use of educational technologies. Although not an easy journey to begin, in time it will prove to be worth the effort. ■

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